

# New records and a new species of chewing lice (Phthiraptera, Amblycera, Ischnocera) found on Columbidae (Columbiformes) in Pakistan

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## Abstract

The chewing lice (Phthiraptera) of Columbidae (Columbiformes) from Pakistan are studied. Six species of chewing lice with new host records are recorded and one new species of the genus *Colpocephalum* is described from *Columba livia* in the Karachi region. All the columbid chewing lice from Pakistan are keyed out and the new species is illustrated and compared with the closest allied species.

## Keywords

chewing lice, Columbidae, Pakistan, new records, new species, taxonomy

## Introduction

The study of chewing lice in Pakistan has been neglected for many years, especially in the Sindh region of Pakistan. During 1940s to 1950s, Ansari published his work on lice from Pakistan, but his studies were restricted to Lyallpur (now Faisalabad), in

the Punjab Province of Pakistan (Ansari 1947, 1951, 1955a–e, 1956a, b). Most of his work referred to the Punjab region of India (Ansari 1957a, b, 1958, 1959).

Lakshminarayana (1979) published a list of Mallophaga from India and its adjacent countries, listing only those chewing lice species that were reported by Ansari from Lyallpur, Pakistan.

After Ansari (1955b; 1958), no taxonomic studies have been carried out in Karachi, Pakistan. Here we present a key to species of columbid chewing lice of this region and describe a new species of the genus *Colpocephalum*. This new species is compared with the closest allied species of the genus.

## Material and methods

The chewing lice used in this study were preserved on microscopic slides using a standard method (Palma 1978) and mounted in Canada-balsam. Line diagrams were made using micro-ocular graticule with a light microscope. Collected species have been deposited in the Natural History Museum, University of Karachi (NHMUK), Pakistan and the Moravian Museum (MZM), Burno, Czech Republic.

## Abbreviations:

<b>AL</b>	Abdominal Length
<b>DHS</b>	Dorsal Head Seta
<b>GL</b>	Genital Length
<b>HL</b>	Head Length
<b>ML</b>	Metathorax Length
<b>MW</b>	Metathorax Width
<b>PL</b>	Pronotal Length
<b>PML</b>	Paramere Length
<b>POW</b>	Preocular Width
<b>PW</b>	Pronotal Width
<b>TL</b>	Total Length
<b>TW</b>	Temporal Width

## Results

### Chewing lice Species of Columbidae in Pakistan

*Bonomiella columbae* Emerson, 1957 – **New record**

*Campanulotes bidentatus* Scopoli, 1763 (Lakshminarayana 1979)

*Campanulotes compar* Burmeister, 1838 – **New record**

*Coloceras piageti* Johnston & Harrison, 1912 (Ansari 1947, Lakshminarayana 1979)  
*Colpocephalum afrozeae* sp. n.  
*Colpocephalum turbinatum* Denny, 1842 (Ansari 1951)  
*Columbicola columbae* L. 1758 (Ansari 1947)  
*Columbicola theresae* Ansari, 1955 (Lakshminarayana 1979)  
*Columbicola tschulyschman* Eichler, 1942 – **New record**  
*Hohorstiella lata* Piaget, 1880 – **New record**  
*Hohorstiella modesta* Ansari, 1951 (Lakshminarayana 1979)  
*Hohorstiella streptopeliae* Eichler, 1953 – **New record**  
*Turturicola salimalii* Clay & Meinertzhagen, 1937 – **New record**

### Key to the chewing lice species of Columbidae in Pakistan

- 1 Maxillary palpi present; meso and metathorax separated..... **Amblycera, 2**
- Maxillary palpi absent; meso and metathorax fused, forming pteronotum ....  
..... **Ischnocera, 7**
- 2 Postpalpal process present.....**Hohorstiella, 3**
- Postpalpal process absent ..... **5**
- 3 Head much broader than long; anterior head margin broadly convex; abdomen short and oval; three abdominal sternites (st. III–V) with thick setal brushes ..... **H. modesta (Ansari)**
- Head broader than long; anterior head margin relatively more convex; abdomen large and oblong; two abdominal sternites with setal brushes ..... **4**
- 4 Postpalpal process short; antennal segment II small and rounded; prosternal plate small; abdominal sternite IV–V with thin setal brushes; vulval margin wide with thin short to long setae ..... **H. lata (Piaget)**
- Postpalpal process long; antennal segment II large and globulate; abdominal sternite III–IV with dense setal brushes; vulval margin narrow with thin microsetae to short fine setae..... **H. streptopeliae Eichler**
- 5 Head without ocular and occipital carinae; femur III and abdominal sternites without ctenidia..... **Bonomiella columbae Emerson**
- Head with ocular and occipital carinae; femur III and abdominal sternites with fine ctenidia ..... **Colpocephalum, 6**
- 6 Femur III and abdominal sternite III with two fine ctenidia on each; male genital sclerite large, with short and fine latero–posterior points; penis short; female subgenital plate with medially short, stout setae..... **C. afrozeae sp. n.**
- Femur III and sternite III with three ctenidia on each; male genital sclerite with long and slightly curved latero–posterior points; penis long; female subgenital plate with lateral tufts of setae..... **C. turbinatum Denny**
- 7 Head circumfasciate; temples large or broad, angulated ..... **8**
- Head non–circumfasciate; temples short and rounded..... **10**

- 8      Antennae dimorphic; scape very enlarged in male .....  
          ..... ***Coloceras piageti* (Johnston and Harrison)**
- Antennae monomorphic ..... ***Campanulotes*, 9**
- 9      Female larger in size, not less than 1.58 mm long; ventral median setae on  
          sternites VI and VII absent ..... ***C. bidentatus* (Scopoli)**
- Female smaller in size, not more than 1.34 mm long; ventral median setae on  
          sternites VI and VII present ..... ***C. compar* (Burmeister)**
- 10     Median head setae blade-like, on anterior dorsal plate; anterior dorsal plate  
          divided medially; preantennal width narrow ..... ***Columbicola*, 11**
- Median head setae not blade-like, on anterior dorsal plate; anterior dorsal  
          plate complete; preantennal width broad .....  
          ..... ***Turturicola salimalii* Clay and Meinertzhagen**
- 11     Head length more than 0.55mm; posterior median head setae spike-like,  
          shorter than anterior median head setae; male genitalia with triangular meso-  
          somal plate, with groves directed towards median; female subgenital plate  
          without lateral row of setae, grove with clear lateral indentations .....  
          ..... ***C. theresae* Ansari**
- Head length less than 0.55mm; posterior median head setae hair like or spike  
          like, equal or longer than anterior median head setae; male genitalia with me-  
          dially divided mesosomal plate, with anterior grove, bearing pores in or out of  
          the pigmented border; female subgenital plate with lateral row of setae, grove  
          without indentations ..... **12**
- 12     Posterior median head setae hair-like and longer than anterior median head  
          setae; male genitalia with relatively long, straight and posteriorly narrower  
          parameres, mesosomal plate with shallow and narrow anterior grove, two pairs  
          of pores present at mediolateral margins of mesosomal plate; female subgenital  
          plate narrow with smooth posterior grove ..... ***C. tschulyschman* Eichler**
- Posterior median head setae spike-like, more or less equally long to anterior  
          median head setae; male genitalia with short, stumpy parameres, curved inside  
          outwards, mesosomal plate with large or deep anterior grove, anterior pair of  
          mesosomal pores present at lateral margins within the dark pigmented bor-  
          ders; female subgenital plate relatively wider with wavy posterior grove, long  
          and wide, bearing 4–8 pairs of medium to long setae ..... ***C. columbae* (L.)**

### Suborder Amblycera Kellogg, 1896

### Family Menoponidae Mjöberg, 1910

#### ***Bonomiella columbae* Emerson**

[http://species-id.net/wiki/Bonomiella\\_columbae](http://species-id.net/wiki/Bonomiella_columbae)

*Bonomiella columbae* Emerson 1957: 63, 1972: 37, Selim et al. 1968: 79, Hill and Tuff  
 1978: 308, 316, Price et al. 2003: 93, 303, 308.

**Material examined.** 2 females, on *Columba livia* (Gmelin); Pakistan: Karachi; 21-V-2004; leg. Naz.

New record from Pakistan.

***Colpocephalum afrozeae* sp. n.**

urn:lsid:zoobank.org:act:CC7DD2BC-D82F-4E06-89E7-8C3EB8A5739F

[http://species-id.net/wiki/Colpocephalum\\_afrozeae](http://species-id.net/wiki/Colpocephalum_afrozeae)

Figs 1–12

**Holotype.** male, on *Columba livia* (Gmelin); Pakistan: Karachi; 20-VII-2006; leg. Naz, S.

**Paratype.** 8 males, 12 females, on *Columba livia* (Gmelin); Pakistan: Karachi; 20-VII-2006; leg. Naz, S.

**Other material.** 6 nymphs, on *Columba livia* (Gmelin), with data as above.

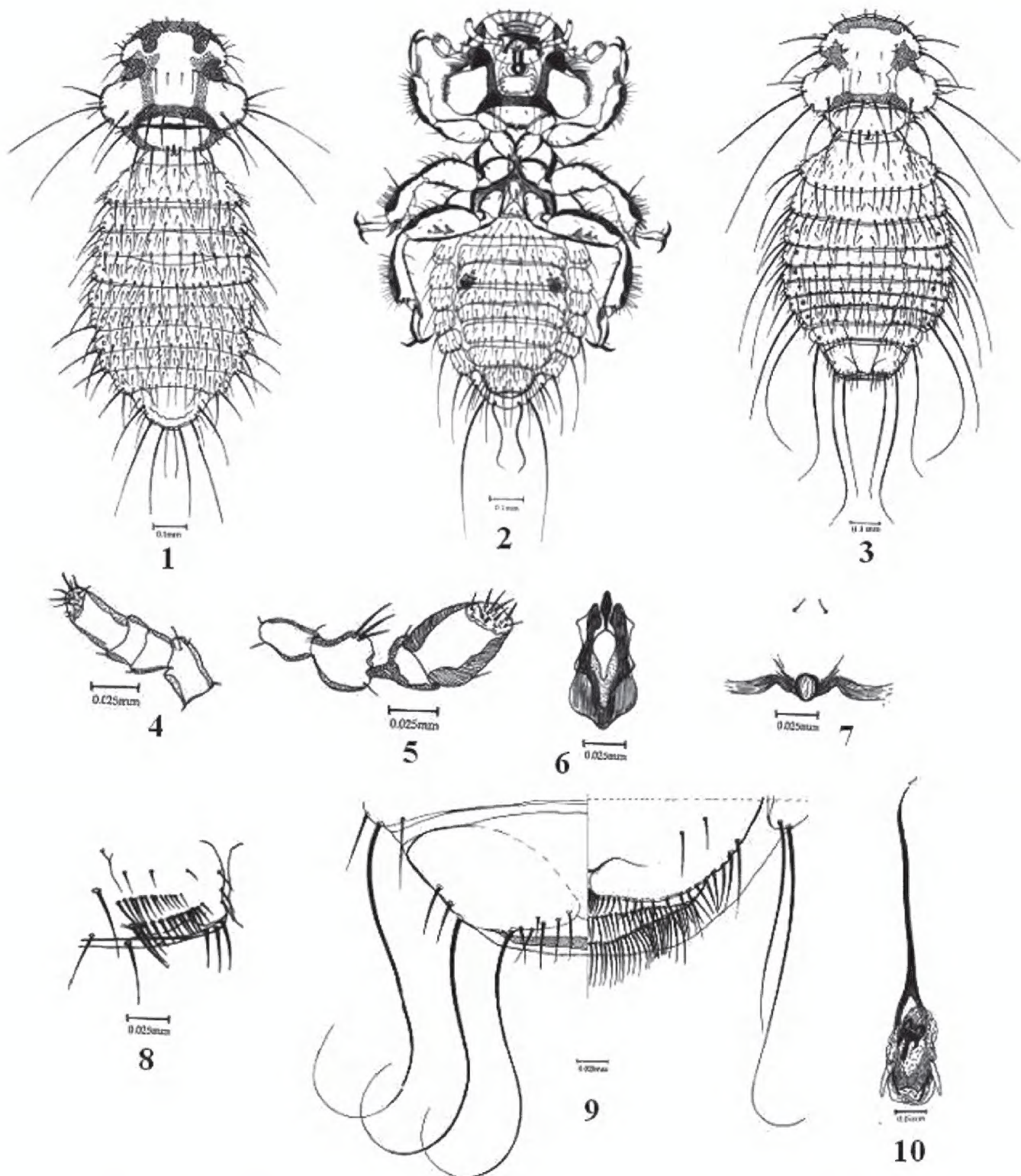
**Type host.** *Columba livia* (Gmelin) (Columbiformes: Columbidae).

**Measurements.** TL: male 1.242 (1.24–1.245) (Figs 1–2), female 1.330 (1.285–1.375) (fig. 3); HL: male 0.287 (0.286–0.288), female 0.302 (0.30–0.305); POW: male 0.318 (0.315–0.332), female 0.347 (0.345–0.35); TW: male 0.45 (0.445–0.455), female 0.492 (0.48–0.505); PL: male 0.12 (0.11–0.13), female 0.137 (0.135–0.14); PW: male 0.288 (0.255–0.322), female 0.332 (0.325–0.34); ML: male 0.135 (0.12–0.15), female 0.152 (0.15–0.155); MW: male 0.374 (0.322–0.426), female 0.51 (0.505–0.515); AL: male 0.658 (0.642–0.675), female 0.697 (0.685–0.71), GL: 1.03 (1.01–1.05), GW: 0.155 (0.15–0.16), PML: 0.055 (0.050–0.060).

**Head** (Figs 1–6). Anterior marginal carina very thick, with large and blunt marginal nodi; DHS 8–10 short fine to stout setae; DHS 15 long; occipital setae 21–22 thick setae of normal length; ventral subtemporal setae present; ocular and occipital nodi very well developed, connected with thick oculo–occipital and occipital carinae; maxillary palpi as in fig. 4; antennae (fig. 5) four segmented, pedicel large with short lateral process, bearing three stout sharp setae, flagellomere II long, oval with broad terminal disc; hypopharynx (fig. 6) very well developed.

**Thorax** (Figs 1–3, 7). Pronotal carina very thickly sclerotized; pronotal seta 2 minute peg-like setae; lateral to posterior margin of pronotum with four long and at least two short setae; prosternal plate (fig. 7) weakly developed, short, with posterior margin convex and lateral margins absent, one pair of small microsetae anterior to the plate present; posterior margin of metanotum straight, with 8–10 normal fine setae, arranged equally without any gape; femur III with two ctenidia.

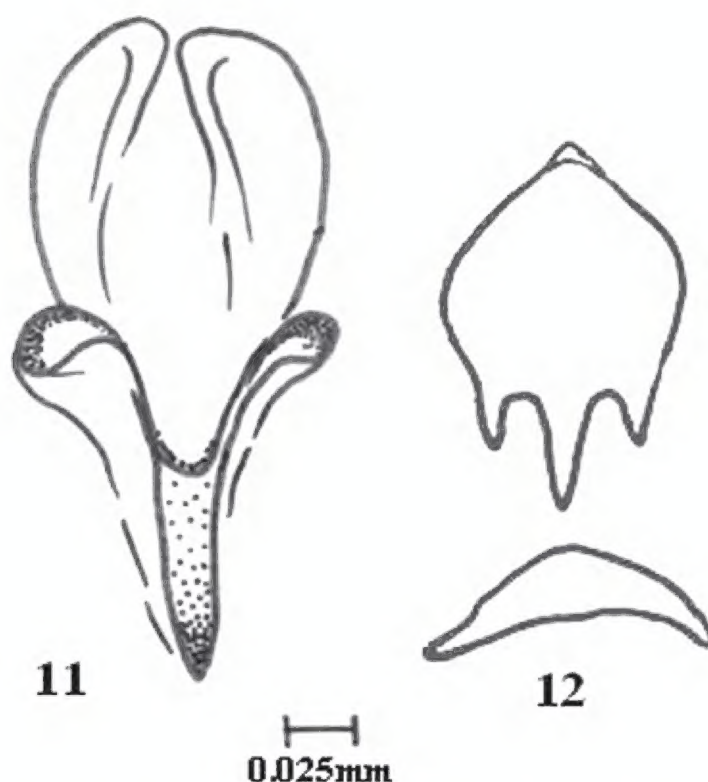
**Abdomen** (Figs 1–3, 8). Male. Tergal plates complete, marginal setae from tergite I–VIII: 12, 14, 17, 18, 16, 16, 15 and 13 respectively; anterior tergal setae scattered, ranging from 14–28 microsetae; postspiracular seta long on segment II, V–VII, shorter on segments III–IV and VIII; sternal setae in double rows on sternites I–VII: 15, 24, 16 (+ two large ctenidia on segment III; fig. 8), 24, 21, 20 and 16 respectively. Terminalia (Figs 1–2): Terminal segment comprises segments IX and X, posteriorly rounded; large tergal plate usually without anterior setae, latero–posterior margin with



**Figures 1–10.** *Colpocephalum afrozeae* sp. n. **1** male dorsal view **2** male ventral view **3** female dorsal view **4** maxillary palp **5** antenna; **6** hypopharynx **7** prosternal plate **8** sternite IV with ctenidia **9** female terminalia ventral view **10** male genitalia

two long macrosetae and posterior margin bears four long macrosetae and two short fine setae; sternites VIII forming a short subgenital plate, bearing dense scattered small thin setae; anal margin almost straight.

Female. Tergites I and II complete, wide and long, tergites III–VIII divided, tripartite, narrow and short; tergo-central setae on segment I and II long; tergal marginal setae from I–VIII: 20, 20–22, 16–18, 18–20, 16–19, 17, 18 and 14–16 respectively; postspiracular setae long on II–III, VI–VIII; segment VIII with one pair of long, latero-anterior setae; sternite I developed, sternite II–VIII complete and well sclerotized; sternal setae small short to fine, scattered all over the plates; sternite III with two long



**Figures 11–12.** *Colpocephalum afrozeae* sp. n. **11** penis details **12** genital sclerite.

ctenidia (fig. 8). Terminalia (fig. 9): Terminal segment widely rounded posteriorly; tergite IX divided, median piece triangular; posterior margin of lateral plates with small fine setae and two pairs of long macrosetae; anus narrow, transverse with tapering ends; anal fringes bear forty three stout microsetae in anterior fringe and forty seven to fifty fine curved setae in posterior fringe; vulval margin medially concave, with small thick, stout curved setae, gradually larger at latero–posterior ends.

**Male genitalia** (Figs 10–12). Elongated; genital sclerite (fig. 12) short, with long and slightly curved latero-posterior points; genital lateral plates short and thick; basal plate thick and broad; median process long; penis (fig. 11) terminally narrow; parameres straight, tubular.

**Remarks.** *Colpocephalum afrozeae* were collected from *Columba livia* on which *C. turbinatum* has been reported previously. The two species of the genus *Colpocephalum* of *C. livia* are different from each other. *C. afrozeae* has the anterior margin of head broadly convex; anterior marginal carina thick; oculo-occipital carina thick; prothorax with two short marginal setae; femur III with two ctenidia; female tergite II with long tergo-central setae; postspiracular setae long on tergites II–III and VI–VIII; lateral plates of male genitalia very short; lateroposterior points of genital sclerite large and curved; median process reduced; female genital reticulation invisible; vulva medially concave; anus narrow and transverse.

*Colpocephalum afrozeae* has also some similarities with *Colpocephalum arfakiani* Price and Beer, but they have morphological differences, which consist of a thin anterior marginal carina; five long pronotal marginal setae; tergite II of female divided; tergite VIII with small triangular median piece; anal opening broad, with light fringe of short setae; male genital sclerite without latero-posterior points and long lateral plates are found in *C. arfakiani* whereas the anterior margin very thick; four pronotal marginal setae long; tergite II of female complete; tergite VIII with large trapezoidal piece; anal opening narrow and transverse, with dense fringe of

short setae in anterior margin and thick, long setae on posterior margin; male genital sclerite with long and curved latero-posterior points and short lateral plates are found in *C. afrozeae*.

**Etymology.** The present species is named after Mrs Hussan Afroze, mother of the first author.

***Colpocephalum turbinatum* Denny**

[http://species-id.net/wiki/Colpocephalum\\_turbinatum](http://species-id.net/wiki/Colpocephalum_turbinatum)

Fig. 13–16

*Colpocephalum turbinatum* Denny 1842: 198, 209, Harrison 1916: 56, Hopkins and Clay 1952: 84, Price and Beer 1963: 735, 736, 754, Hill and Tuff 1978: 308, 315, Lakshminarayana 1979: 80, Price et al. 2003: 102, 303, 304, 308.

*C. abruptofasciatum* Mjöberg 1910: 36.

*C. ailurum* Nitzsch (In Giebel) 1861: 522.

*C. bicinctum* Nitzsch (In Giebel) 1861: 524.

*C. caudatum* Giebel 1874: 261, Piaget 1880: 519, 1885: 125.

*C. dissimile* Piaget 1880: 520, 1885: 119.

*C. intermedium* Piaget 1880: 521.

*C. latifasciatum* Piaget 1885: 130.

*C. osborni* Carriker 1903: 172.

*C. oxyurum* Nitzsch (In Giebel) 1861: 519.

*C. subflavescens* Piaget 1880: 571.

*C. tricinctum* Nitzsch (In Giebel) 1861: 524, Ansari 1951: 154.

*C. wernecki* Orfila 1959: 477.

*Neocolpocephalum gypae* Qadri 1935: 229.

*N. tricinctum* Eichler 1941: 374.

*Vulturigogus eugenii* Eichler and Zlotorzyska 1963: 207.

*V. femellus* Eichler and Zlotorzyska 1963: 209.

**Material examined.** 91 males, 105 females, on *Columba livia* (Gmelin); Pakistan: Karachi; 21-V-2004, 23-IX-2007; leg. Naz.

***Hohorstiella lata* (Piaget)**

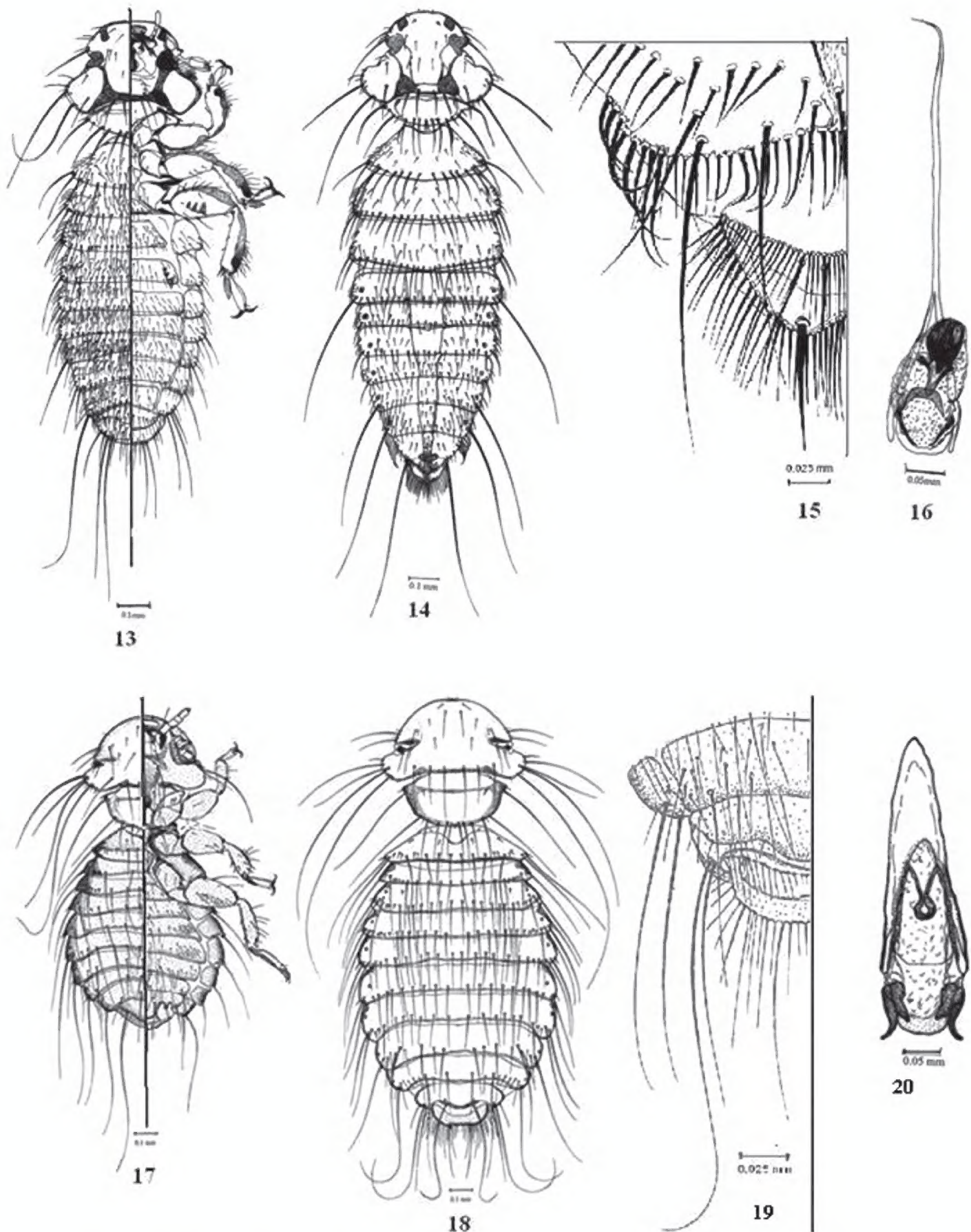
[http://species-id.net/wiki/Hohorstiella\\_lata](http://species-id.net/wiki/Hohorstiella_lata)

Fig. 17–20

*Menopon latum* Piaget 1880: 457.

*Menopon giganteum* Denny 1842: 225, Harrison 1916: 39.

*Hohorstiella lata* Eichler 1940: 362, Hopkins and Clay 1952: 173, Hill and Tuff 1978: 308, 310, Price et al. 2003: 111, 303.



**Figures 13–20.** 13–16. *Colpocephalum turbinatum* Denny 13 male dorso-ventral view 14 female dorsal view 15 female terminalia 16 male genitalia. 17–20. *Hohorstiella lata* (Piaget) 17 male dorso-ventral view 18 female, dorsal view; 19, female terminalia 20 male genitalia.

**Material examined.** 25 males, 39 females, on *Columba livia* (Gmelin), *Streptopelia decaocta* (Frivaldszky); Pakistan: Karachi; 21-V-2004, 04-VIII-2006; leg. Naz. New record from Pakistan.

***Hohorstiella streptopeliae* Eichler**

[http://species-id.net/wiki/Hohorstiella\\_streptopeliae](http://species-id.net/wiki/Hohorstiella_streptopeliae)

Fig. 21

*Hohorstiella streptopeliae* Eichler 1953: 169, Price et al. 2003: 111, 307.

**Material examined.** 4 females, on *Columba livia domestica* (Gmelin) (Fantail Pigeon breed); Pakistan: Karachi; 15-VII-2006; leg. Naz.

New record from Pakistan.

**Suborder Ischnocera Kellogg, 1896****Family Philopteridae Burmeister, 1838*****Campanulotes compar* (Burmeister)**

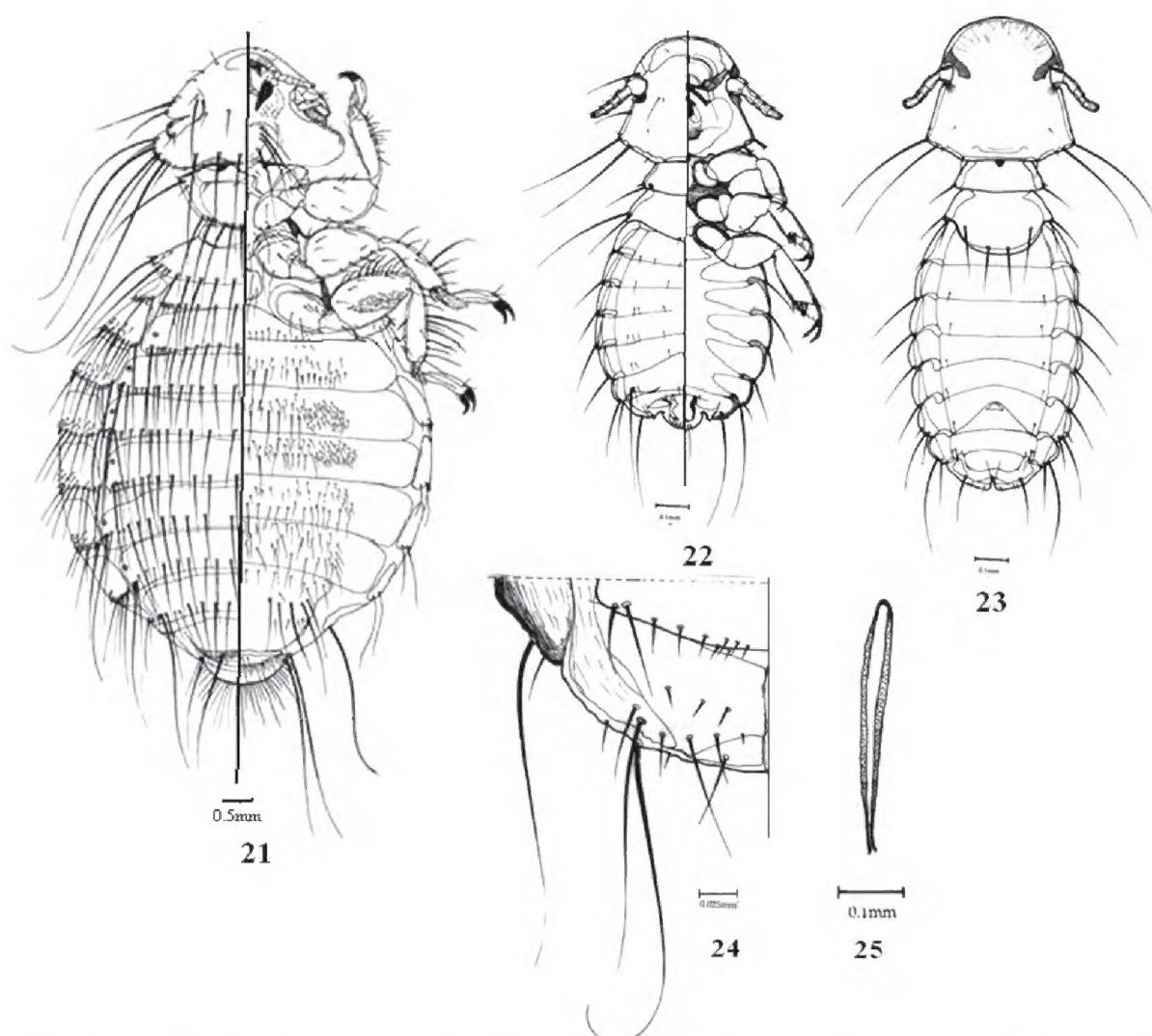
[http://species-id.net/wiki/Campanulotes\\_compar](http://species-id.net/wiki/Campanulotes_compar)

Fig. 22–25

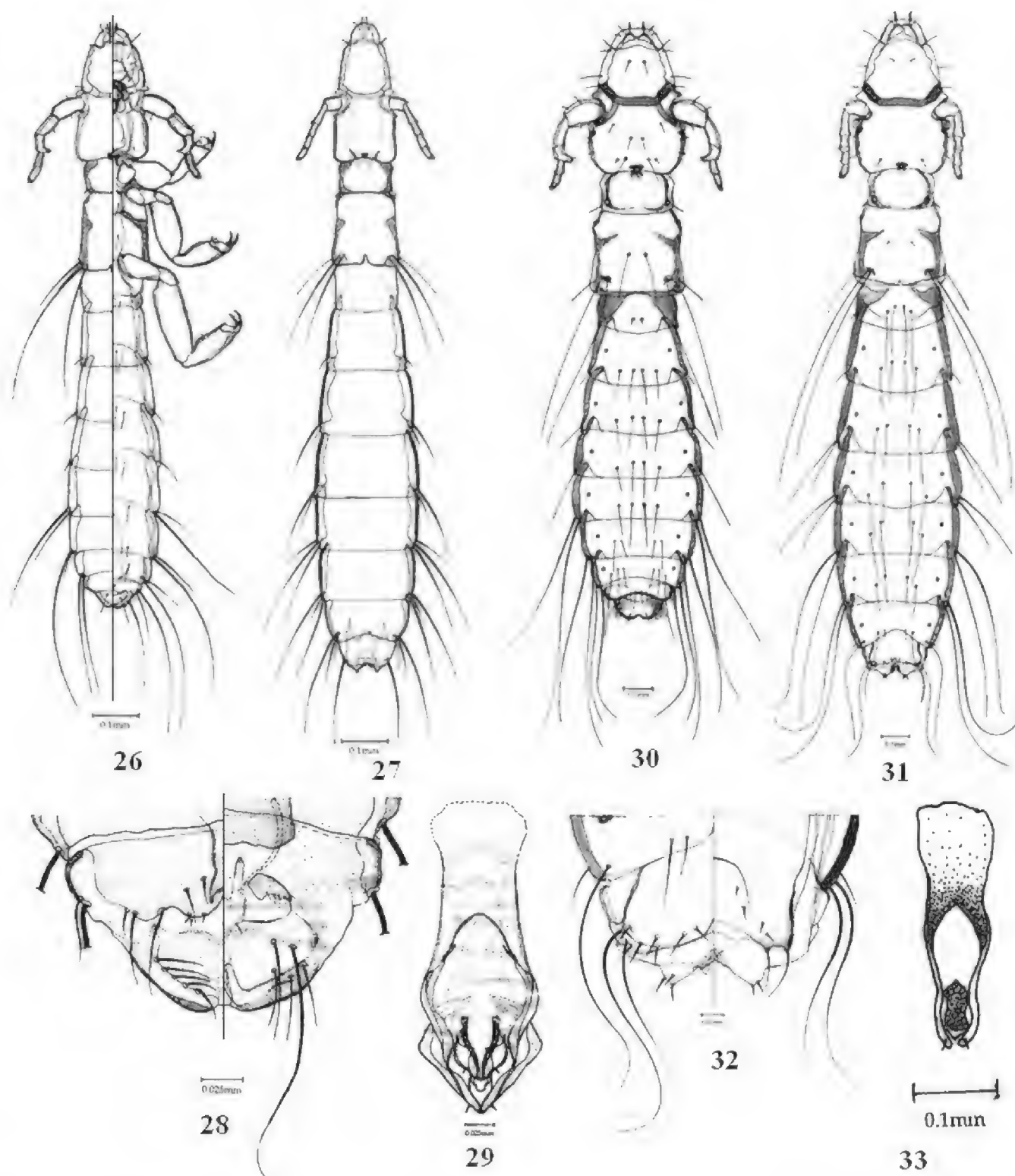
*Goniocotes bidentatus* Scopoli 1763: 385, Harrison 1916: 80.

*G. compar* Burmeister 1838: 431.

*G. formosanus* Sugimoto 1929: 25.



**Figure 21–25.** 21 *Hohorstiella streptopeliae* Eichler, female, dorso-ventral view. 22–25 *Campanulotes compar* (Burmeister) 22 male dorso-ventral view 23 female dorsal view 24 female terminalia 25 male genitalia.



**Figures 26-33.** 26–29 *Columbicola columbae* (L.) 26 male dorso-ventral view 27 female dorsal view 28, male terminalia dorso-ventral view 29 male genitalia. 30–33 *Columbicola tschulyschman* Eichler 30 male dorsal view 31 female dorsal view 32 female terminalia dorso-ventral view 33 male genitalia.

*Goniodes compar* Nitzsch 1818: 294, Denny 1842: 13, Giebel 1842: 12, Piaget 1842: 234, Neumann 1909: 31, Neveu-Lemaire 1919: 1116.

*Campanulotes compar* Keler 1939: 157, Hopkins and Clay 1952: 64, Ansari 1955: 48, Selim et al. 1968: 79, Hill and Tuff 1978: 309, 322, Tendeiro 1969: 380, 1978: 117, Lakshminarayana 1979: 70, Price et al. 2003: 160, 303.

**Material examined.** 51 males, 72 females, on *Columba livia* (Gmelin); Pakistan: Karachi, Hyderabad, Khairpur mir's; 21-V-2004, 04-VIII-2006; leg. Naz.

New record from Pakistan.

***Columbicola columbae* (L.)**

[http://species-id.net/wiki/Columbicola\\_columbae](http://species-id.net/wiki/Columbicola_columbae)

Fig. 26–29

*Pediculus columbae* L. 1758: 614.

*Lipeurus bacillus* Nitzsch 1818: 215.

*L. baculus* Giebel 1866: 379, Kellogg 1896: 506, Neumann 1909: 30.

*L. antennatus* Giebel 1874: 213.

*Philoaterus baculus* Nitzsch 1818: 293.

*Phagopterus columbae* Freire and Duarte 1944: 14.

*Nirmus claviformis* Olfers 1816: 90.

*N. filiformis* Olfers 1816: 90.

*Esthioterum columbae* Harrison 1916: 132.

*Columbicola columbae* Ewing 1929: 117, Ansari 1947: 259, Hopkins and Clay 1952: 86, Tendeiro 1960: 530, 533, Selim et al. 1968: 76, Hill and Tuff 1978: 309, 317, Lakshminarayana 1979: 82, Clayton and Price 1999: 675, Price et al. 2003: 166, 303.

**Material examined.** 48 males, 73 females, on *Columba livia intermedia* (Gmelin), *Columba livia neglecta* Hume; Pakistan: Karachi; 21-V-2004, 23-IX-2007; leg. Naz. New host record from Pakistan.

***Columbicola tschulyschman* Eichler**

[http://species-id.net/wiki/Columbicola\\_tschulyschman](http://species-id.net/wiki/Columbicola_tschulyschman)

Fig. 30–33

*Columbicola tschulyschman* Eichler 1942: 28, Tendeiro 1960: 531, 571, Hopkins and Clay 1952: 88, Price et al. 2003: 168, 303.

*Columbicola montschadskyi* Blagoveshtchensky 1951: 308, Tendeiro 1965: 131.

**Material examined.** 5 males, 6 females, on *Columba livia neglecta* Hume; Pakistan: Karachi; 16-VIII-2007; leg. Naz. New record from Pakistan.

***Turturicola salimalii* Clay & Meinertzhagen**

[http://species-id.net/wiki/Turturicola\\_salimalii](http://species-id.net/wiki/Turturicola_salimalii)

*Turturicola salimalii* Clay and Meinertzhagen 1937: 278, Ansari 1947: 260, Hopkins and Clay 1952: 360, Tendeiro 1965: 26, 48, Lakshminarayana 1979: 174, Price et al. 2003: 246, 307.

**Material examined.** 2 females, on *Columba livia* (Gmelin); Pakistan: Karachi; 16-VII-2005; leg. Naz.

New host record from Pakistan.

## Discussion

This study is the first survey of chewing lice of family Columbidae in Pakistan. Among the nine species found in this region, six species are recorded for the first time. Four of them, *Campanulotes compar*, *Colpocephalum turbinatum*, *Columbicola columbae* and *Hohorstiella lata*, are cosmopolitan (Emerson 1972, Ledger 1980, Mey 2003, Naz and Rizvi 2004, Naz et al. 2010).

Only two species of the genus *Colpocephalum* have been recorded from Columbidae, which are *C. longicaudum* Nitzsch 1866 on *Streptopelia chinensis tigrina* (Temminck) and *C. turbinatum* on *Columba livia* Gmelin (Price and Beer 1963, Price et al. 2003). Kellogg and Paine (1914) have reported *C. longicaudum* from *Columba livia*. Price and Beer (1963) have recorded *C. turbinatum* from various species of Falconiformes. Ansari (1951) reported *C. turbinatum* from *Milvus migrans govinda* Sykes (Accipitridae: Falconiformes) with the synonym *C. tricinctum*, in Lyallpur, Pakistan (Lakshminarayana 1979). Here, this species is reported from *Columba livia* in Karachi, Pakistan. Galloway and Palma (2008) showed that some species of lice can be overlooked for many decades even when they parasitize common hosts.

*Columbicola tschulyschman* is also a regular pigeon parasite. It is known from three species of *Columba* including *C. livia neglecta*, which is also found in Pakistan (Grimmett et al. 1999, Naz et al. 2010) and is probably still isolated from feral pigeons in Pakistan (Johnston 1996). There is no record of this louse species from feral pigeon (Adams et al. 2005).

The presence of *Hohorstiella streptopeliae* on *Columba livia* represents a case of straggling, because its type host is *Streptopelia turtur arenicola* (Hartlert) (Price et al. 2003). Ansari (1947) recorded *Turturicola salimalii* on three species of *Streptopelia* and on *Columba livia* from different regions of India, but he also collected this species from Passeriformes and Psittaciformes and suggested these hosts as likely stragglers.

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